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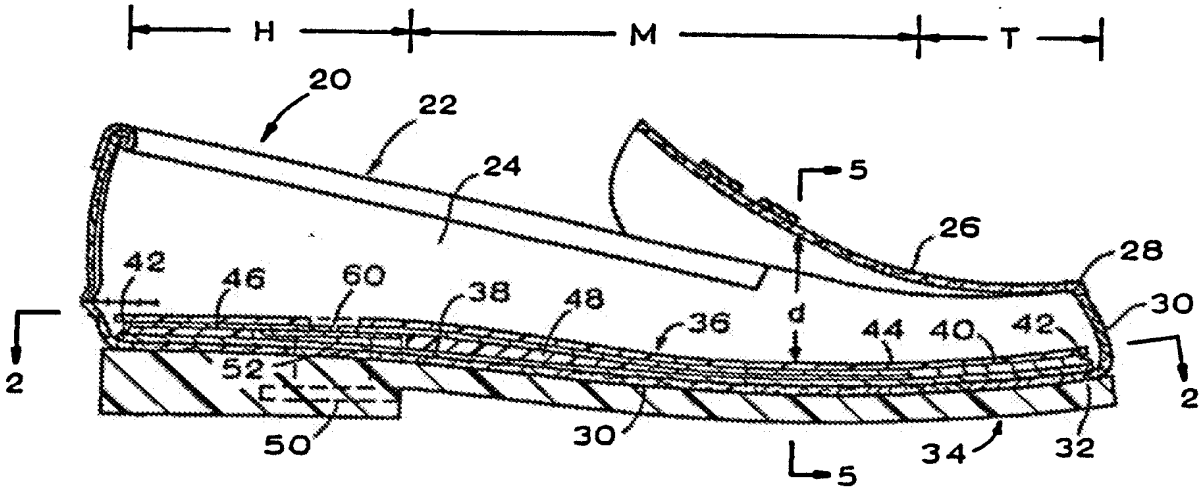

(57) Abstract

An insole assembly having an adjustable thickness for adjusting the fit and girth of a shoe is disclosed. The assembly is designed so that adjustment may be made when the shoe is on the foot.

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ADJUSTABLE GIRTH SHOE CONSTRUCTION

Background of the Invention

The need for improved means of girth adjustment in footwear is accepted in the industry, as continually more offerings are being limited by market economics to single medium widths for each size in length. Studies including those of the U.S. Army QMC have shown that such single width shoes afford only an approximate fit to less than a third of the populace. Those that precisely fit are far less given the normal diurnal foot girth fluctuation that occurs with changes in fluid concentration in the extremities, usually resulting in daily girth change ranging up to two full width increments, with even wider ranges experienced when there are concurrent changes in weather, altitude or a wearer's physical condition.

A commercially successful approach to girth adjustment by varying the thickness of insole inserts is currently being used in shoes sold by Toddler's University, of Westport, CT, and others. In this approach, usually three separate insoles of differing thicknesses are provided with each shoe for insertion therein. The inserts may be used to adjust the girth of the shoe since each insert occupies a different volume in the shoe, particularly in the critical fitting regions of ball waist and instep. Typically, the inserts are designed and designated as N, M and W, (i.e. narrow, medium and wide) and usually represent three consecutive standard width increments.

The above approach has been only modestly successful. It has certain inherent limitations to which the improvements of the present invention are addressed. For example, the above approach requires the use of multiple inserts which must be removed and exchanged by the wearer to achieve girth adjustment. Also, the insert arrangement only allows for adjustment to certain predetermined girths and does not permit the preferred infinitely variable girth adjustment, nor does it permit such girth adjustment while the shoe is on the foot for maximum ease and

accuracy.

In another approach, U.S.S.N. 07/441,978, filed 11/28/89 of this inventor discloses a ramp system that adjusts the shoe girth by insole edge thickness variation only, which may have limited market acceptance due to the market's general preference for a conventional approach, whereby the central portions of the insole are transversely flat under the foot and of constant height above the walking surface.

Accordingly, it is an object of the present invention to provide means for adjustment of the fit of a shoe in all of its critical fitting areas including the mid-portion areas of the ball, waist, and instep.

It is a further object to provide a shoe girth adjustment means which is substantially concealed so as not to affect the appearance or styling of the shoe.

It is still another object to provide an adjustment means offering infinite adjustability over a given range to more precisely match the differing girth needs of each foot.

Another object is to provide girth adjustment means which is adjustable while on the wearer's foot.

It is also an object to provide a girth adjustment means easily adaptable for use in both lined and unlined shoes with the widest possible choice of upper and bottom materials, where such means can either be built into a shoe at its manufacture or incorporated in a shoe thereafter.

Summary of the Invention

Accordingly, the present invention is directed to a shoe having an insole assembly disposed therein, which contains a means to vary the thickness of the assembly at least at the mid-portion of the shoe. The thickness varying means is an

integral part of the assembly rather than removable elements or inserts which must be exchanged to effect thickness adjustment. The insole assembly extends substantially across the width of the shoe at least at the mid-portion and preferably along the entire length of the shoe cavity. As the thickness is varied, the fitting height between the top of the insole assembly and the inner surface of the upper within the shoe cavity decreases particularly in the mid-portion of the shoe, thereby decreasing the girth of the shoe in this critical fitting area.

The means to vary the thickness of the insole assembly generally comprises at least one and preferably two movable members such as movable ramps which are disposed in a portion of the insole assembly. The movable members extend across substantially the entire width of the insole assembly. To increase the thickness of the insole assembly, the movable members may be moved forward toward the toe of the shoe, thereby increasing the thickness of the assembly in the midportion of the shoe across substantially the entire width of the shoe cavity. Since the movable members extend across the width of the assembly the transverse contour of the assembly remains substantially flat no matter the position of the movable members.

While any suitable mechanism may be employed to move the movable members, it is presently preferred to employ a cable mechanism comprising one or more cables connected to the movable members and a rotatable member which is also connected to the cables. Rotation of the rotatable member moves the movable members forward or rearward depending on the direction it is turned. In the preferred embodiment the rotatable member is preferably disposed in the heel of the shoe and extends through the heel at its breast so that adjustment can be made by the wearer without removing the insole assembly from the shoe or the shoe from the foot. In another embodiment, the insole assembly generally comprises an expandable bladder which may be adjusted to increase and decrease the fitting height. Alternatively, a removable insole assembly may be employed which requires removal

of the assembly to effect adjustment.

For a fuller understanding of the nature and objects of the present invention, reference should be made to the following detailed description taken in connection with the accompanying drawings.

Brief Description of the Drawings

Fig. 1 is a side-elevational cross-sectional view of a shoe of the present invention adjusted to its maximum girth.

Fig. 2 is a plan view of the insole assembly and bottom details of the shoe of Fig. 1, taken along line 2-2 thereof.

Fig. 3 is a side elevational cross-sectional view of a shoe of the present invention adjusted to its minimum girth.

Fig. 4 is a plan view of the insole assembly and bottom details of the shoe of Fig. 3 taken along line 4-4 thereof.

Fig. 5 is a transverse cross-sectional view of the shoe of Fig. 1, taken on line 5-5 thereof.

Fig. 6 is a transverse cross-sectional view of the shoe of Fig. 3, taken on line 6-6 thereof.

Fig. 7 is a plan view of a removable insole assembly of this invention.

Fig. 8 is a transverse cross-sectional view of the insole assembly of Fig. 7, taken at the heel portion thereof on line 8-8.

Fig. 9 is a transverse cross-sectional view of the insole assembly of Fig. 7, taken in the ball area thereof on line 9-9.

Fig. 10 is a side sectional view of the insole assembly of

Fig. 7, taken on line 10-10 thereof.

Fig. 11 is a side-elevational cross-sectional view of another shoe of the present invention.

Fig. 12 is a plan view of the insole assembly of the shoe of Fig. 11.

Detailed Description of the Invention

Referring to the drawings, the improved girth adjustment means of the present invention will be described with reference to a shoe of the well-known loafer design. It should, however, be understood that this is being done for ease of reference and that the invention is not limited to such a shoe style. In various embodiments described hereinafter, like reference numbers refer to like members which function in the same or similar manner.

Referring to Figs. 1-6, shoe 20 generally comprises an upper 22 having a plug 26 attached at a sewn seam 28 to a vamp 30. The seam 28 extends substantially around the forepart and mid-portion of the upper 22 which in turn is secured by cement adhesive and/or stitching 32 or by other conventional means to a unitsole 34. The upper 22 may be made of any of the conventional upper materials, including leather, fabric and the like. Unitsole 34 can be molded of conventional rubber and/or plastic materials, or can alternatively be a conventional assembly of molded and/or sheet materials.

As best shown in Figs. 1-4, the insole assembly 36 is disposed along the bottom of the shoe cavity 24 adjacent the top surface of the bottom of vamp 30 and unitsole 34. The insole assembly extends substantially along the entire length of the shoe cavity from the heel portion H, through the midportion M and toe portion T, and across substantially the entire width of the cavity 24. While this is the preferred design, the insole assembly need not extend across substantially the entire inside

width of the shoe at the toe and heel portions but merely in the mid-portion.

The insole assembly generally comprises a base member 38 and a top member 40 attached to the base member preferably by stitching 42, along the peripheral edges of the two members so as to form a cavity therebetween. The base member 38 is made from a relatively firm material such as board materials available from Texan, Inc. of Russell, MA and others. The top member is preferably made from a stretchable material such as Spandura,, a heavy-duty nylon spandex material available from H. Warshaw and Sons, Inc., New York, New York. Contained within the cavity formed between members 38 and 40 is a fixed position heel spacer 46 and movable ramps 48. The spacer 46 and ramps 48 are preferably made from a relatively firm but flexible cellular plastic foam such as ethylene-vinyl acetate copolymer, available from Monarch Rubber Co. of Baltimore, MD and others. While two ramps 48 are shown in this embodiment one or multiple ramps such as 3, 4 or more may be employed, including opposing ramps and ramp array (not shown). The ramps preferably vary in thickness, gradually decreasing in thickness in the direction towards the toe of the shoe.

The insole assembly also includes adjustment mechanism comprising a rotatable thumbwheel 50 which is attached to cables 54 which cables are attached to ramps 48; the operation of which is described hereinafter. Alternatively or jointly, a coin slot 60 can be used to control the adjustment means. Finally, while not necessary, the insole assembly preferably includes a removable insole or cushion 44 disposed on the top surface of the top member 40 of the insole assembly. Cushion 44 is unattached, although temporary attachment may be achieved by means such as adhesive means, Velcro fasteners and the like. The cushion 44 is removable for its cleaning and the cleaning of the shoe cavity 24 as well. It is preferably made from a relatively firm but cushioned material such as a plastic foam material laminated on its top surface to a fabric or leather sheet material.

As best shown in Figs. 2 and 4, the adjustment mechanism generally comprises cables 54 a-d, which are fixed to and wound around cable drum 52. As the radial positioning of drum 52 is adjusted by turning thumbwheel 50, cable 54, fastened to ramps 48 and rivets 62, moves through eyelets 64 and 66 (in the base 38) in such a way as to move both ramps simultaneously in the same direction, in a manner similar to the cable-activated parallel rules commonly used on drafting boards. When placed in the cavity 24 adjacent the vamp 30, insole assembly 36 together with a portion of the vamp 30 form a cavity in which cables 54 are free to move to permit adjustment of the ramps 48.

Girth adjustment is achieved by the movement of the ramps 48. Thus, when the ramps are in the most rearward position as shown in Figs. 1, 2, and 5, the fitting height d is at its maximum value. As a result the girth of the shoe is at its greatest value. As the ramps 48 are moved forward, the fitting height d gradually decreases as the thickness in the mid-portion increases until the ramps arrive at their forward most position as best shown in Figs. 3 and 4. At this point the fitting height d' and girth are at their minimum values. Of course, the fitting height and girth may be infinitely adjusted between these extremes merely by positioning the ramps 48 accordingly.

In an alternative embodiment, which is best shown in Figs. 7-10, a removable insole assembly 70 is shown. The only differences between this assembly and assembly 36 of Figs. 1-6 is the replacement of thumbwheel 50 with a turning coin slot 60. This allows the assembly 70 to be removed from the shoe cavity 24. Fig. 8 shows the heel portion of the assembly 70 showing the coin slot 60 flush with the bottom assembly to facilitate a smooth fit in the shoe cavity. As shown, the assembly is not adjustable when the foot is in the shoe since coin slot 60 does not extend outside of the shoe. Fig. 9 shows a transverse cross-sectional view of the assembly 70 at the ball portion of the foot with ramps 48 moved to their most forward position. Finally, Fig. 10 shows a longitudinal side elevational view of

the assembly of Fig. 7 showing again the ramps 48 in their most forward position.

In another embodiment shown in Figs. 11-12, an expandable bladder is employed to increase the thickness of the insole assembly particularly in the mid-portion of the shoe. Specifically, the insole assembly 80, generally comprises an expandable bladder 82, which extends throughout the mid portion into the toe portion of the shoe and a removable insole or cushion 84 disposed directly above the bladder 82. The bladder 82 contains a pump/valve assembly 86 which extends through the sole 88 of the shoe 20 adjacent the breast of the heel so as to be easily accessible to the wearer to make the girth adjustment while at the same time being protected from undue abrasion during use of the shoe. Fig. 11 shows the shoe at about its minimum girth with a maximum amount of air in the bladder 82. In use the pump/valve assembly is used to adjust the amount of air in the bladder, thereby adjusting the thickness of the insole assembly and thereby the girth of the shoe. The bladder may be made from any suitable material which is air impervious such as a urethane film. The pump/valve assembly portion of the bladder may be any of the conventional two-way pump and valve assemblies known and used in the art. Particularly preferred pump/valve bladder assemblies are similar to those currently being used for different purposes in sneakers sold and marketed by Reebok Corp. of Stockton, MA. and LA Gear of Los Angeles, CA. While air bladders are presently preferred, bladders which employ other gases, gels or fluids may be used instead of air bladders to achieve the same result.

It is intended that all matter contained in the above description and shown in the accompanying drawings is illustrative rather than limiting. It should be further understood that the following claims are intended to cover all of the generic and specific features of the invention herein described.

What is Claimed is:

1. An insole assembly for use in a shoe to vary the girth of the shoe comprising an adjustable assembly having a heel portion, a toe portion and a mid-portion therebetween, said adjustable assembly having at least one movable member disposed in a portion of the adjustable assembly, which movable member is adjustably positionable at different portions of the assembly so as to increase the thickness of the assembly substantially across its entire width at least at the mid-portion at those other portions, said adjustable assembly being proportioned so as to be capable of fitting in a shoe and extending across substantially the entire width of the shoe at least at the mid-portion of the shoe.

2. The insole assembly of Claim 1, wherein the movable member varies in thickness along its length.

3. The insole assembly of Claim 1, wherein the adjustable assembly contains two movable members.

4. The insole assembly of Claim 1, wherein the at least one movable member is adjustably positioned by means of a cable mechanism.

5. The insole assembly of Claim 4, wherein the cable mechanism comprises at least one cable attached to the at least one movable member and a rotatable member.

6. The insole assembly of Claim 1, wherein the adjustable assembly additionally comprises a base member and a top member, with said at least one movable member being disposed between both of said members.

7. A shoe comprising an upper member having an inner surface and a bottom member attached thereto and defining a shoe cavity for insertion of a foot, said shoe cavity having a toe

portion, a heel portion and a mid-portion therebetween, and the insole assembly of any of Claims 1-6 having an upper surface disposed within the cavity adjacent the bottom member, said insole assembly extending across substantially the entire width of the cavity at least at the mid-portion of the shoe, said cavity having a fitting height extending vertically from the upper surface of the inner assembly and the inner surface of the upper, said insole assembly having a means integral with the assembly to vary the thickness of the assembly across substantially its entire width at least at the mid-portion so as to vary the fitting height, thereby adjusting the girth and fit of the shoe.

8. The shoe of Claim 7, wherein the thickness varying means comprises at least one movable member disposed in a portion of the insole assembly and adjustably positionable at other portions of the assembly so as to increase the thickness of the assembly at those said other portions.

9. The shoe of Claim 8, wherein the member has a varying thickness which increases in the direction extending from the toe to heel portion.

10. The shoe of Claim 7, wherein the shoe contains a heel member attached to the bottom member at the heel portion and the rotatable member is disposed in the heel member.

11. The shoe of Claim 7, wherein the means for varying the thickness of the inner assembly is adjustable from outside of the shoe.

12. The shoe of Claim 1, wherein the means to vary the thickness of the assembly comprises a fluid expandable bladder.

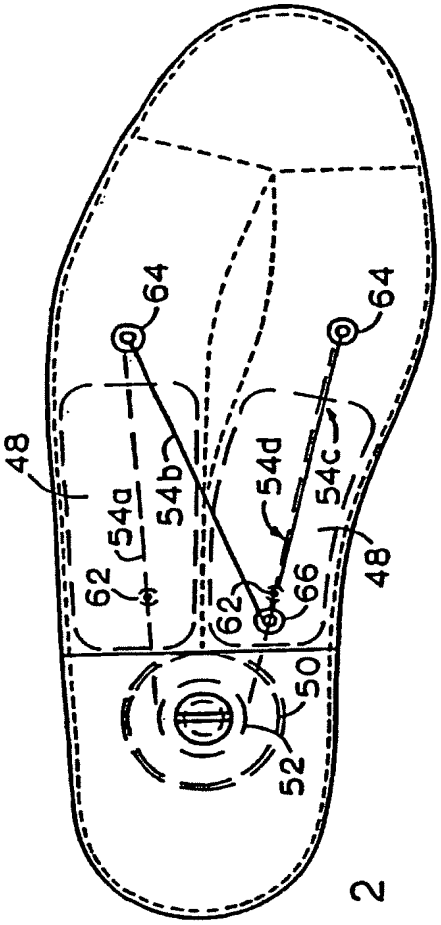
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FIG. 2

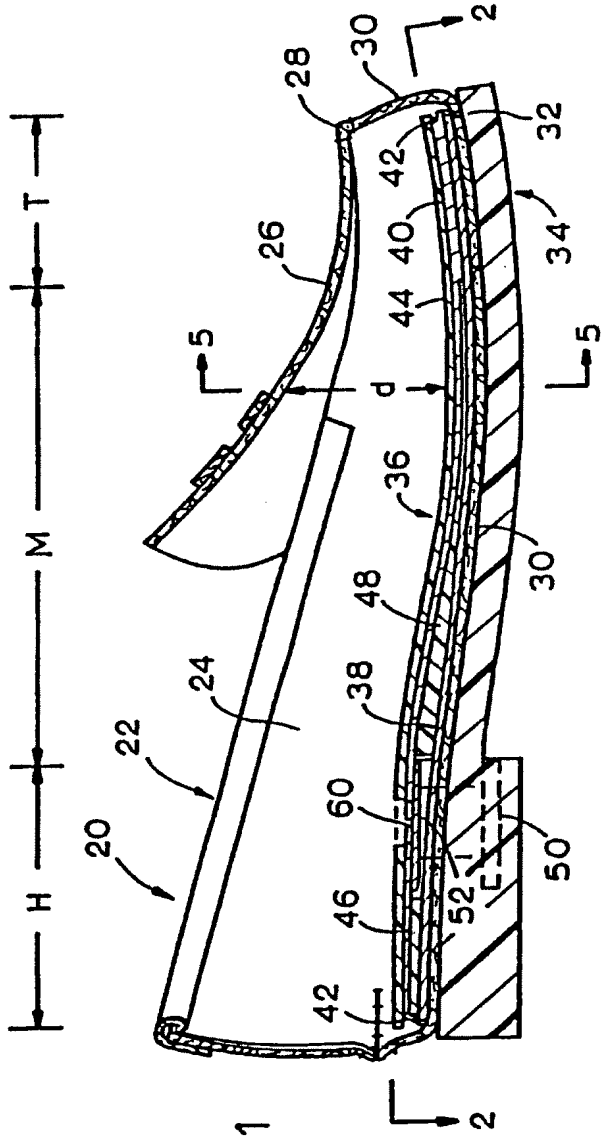
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FIG. 1

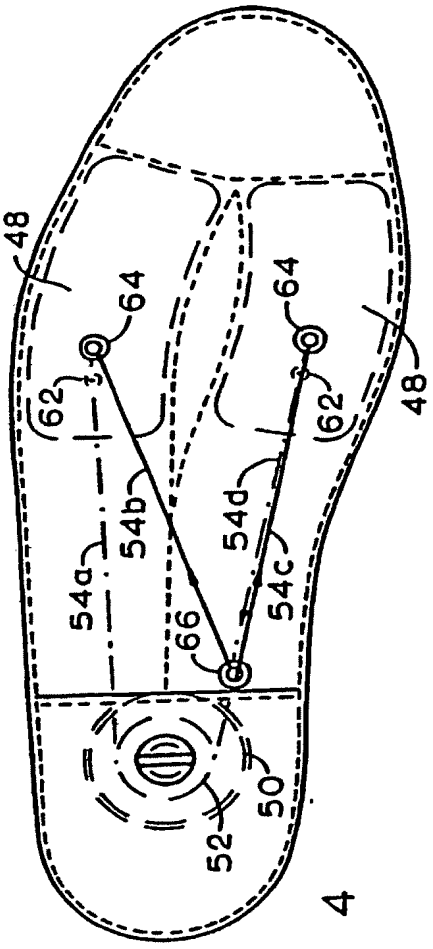
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FIG. 4

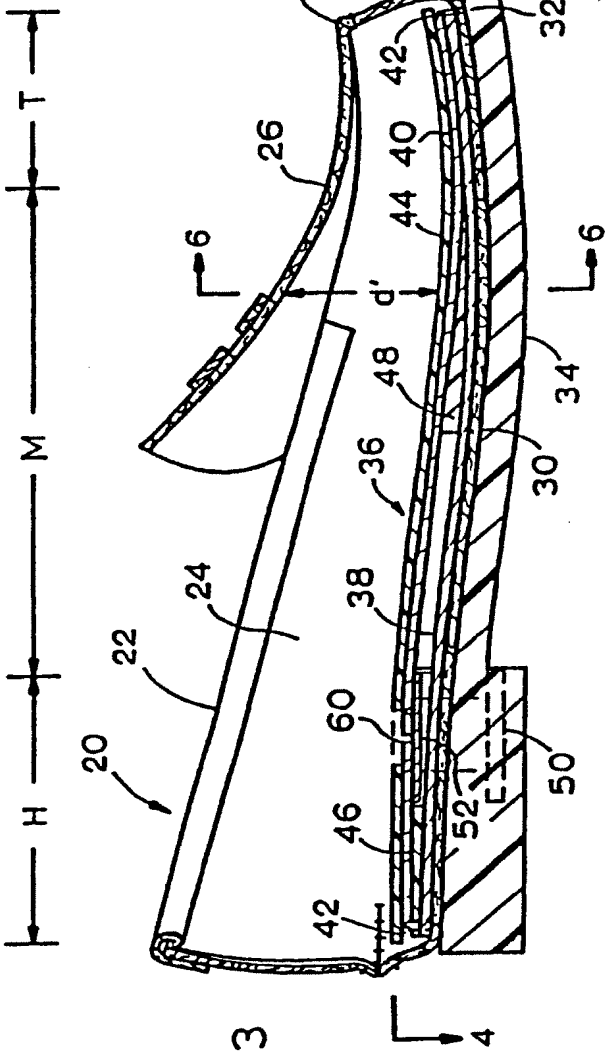
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FIG. 3

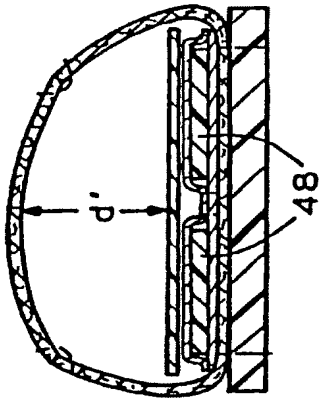

FIG. 6

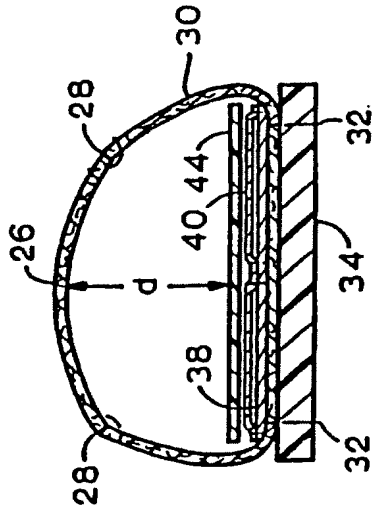

FIG. 5

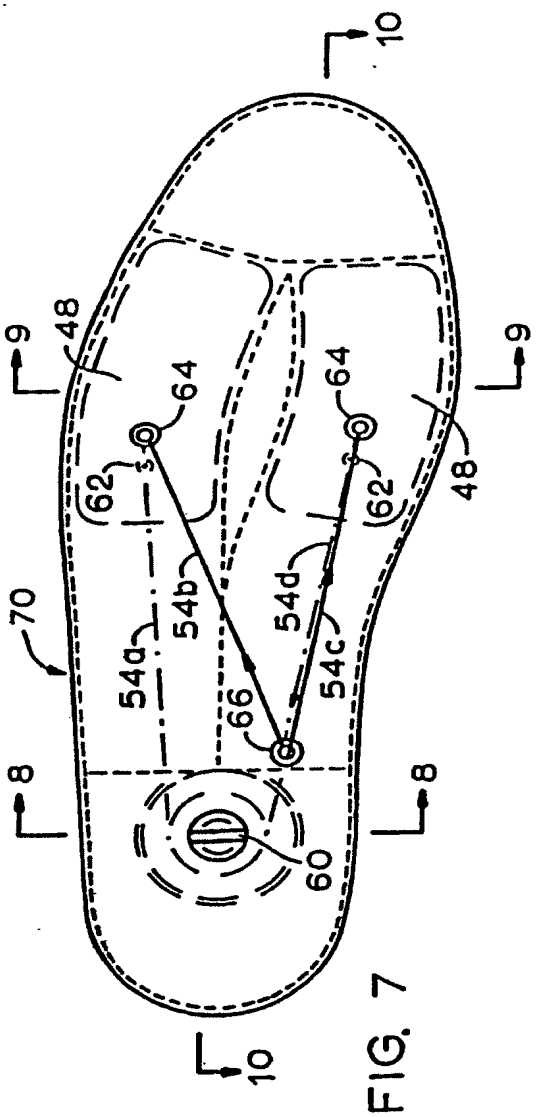

FIG. 7

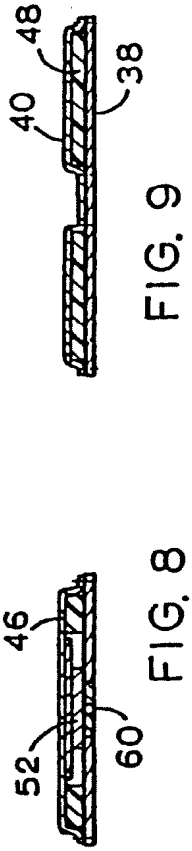

FIG. 8

FIG. 9

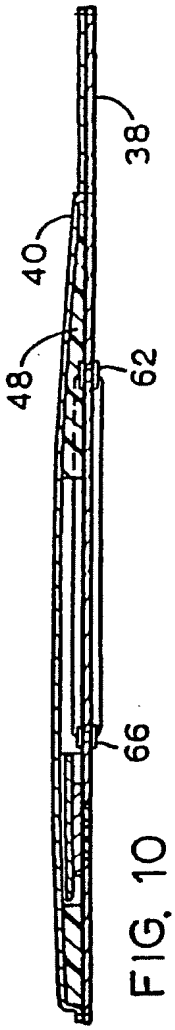

FIG. 10

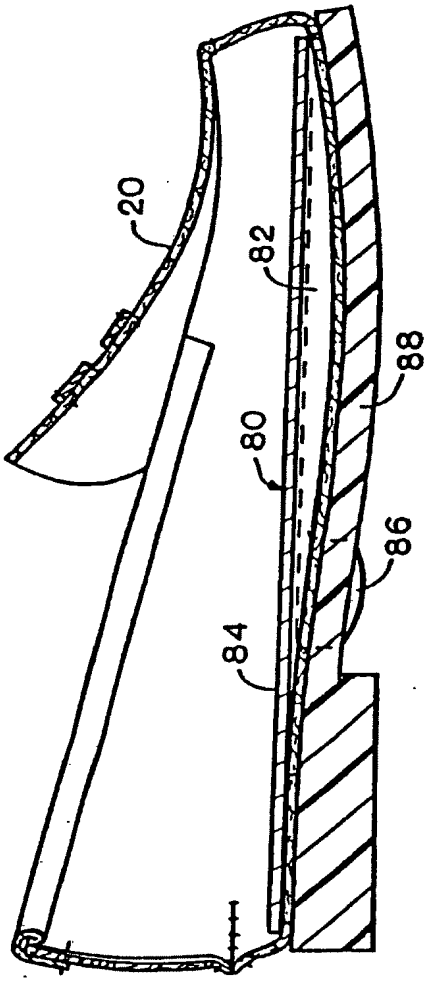

FIG. 11

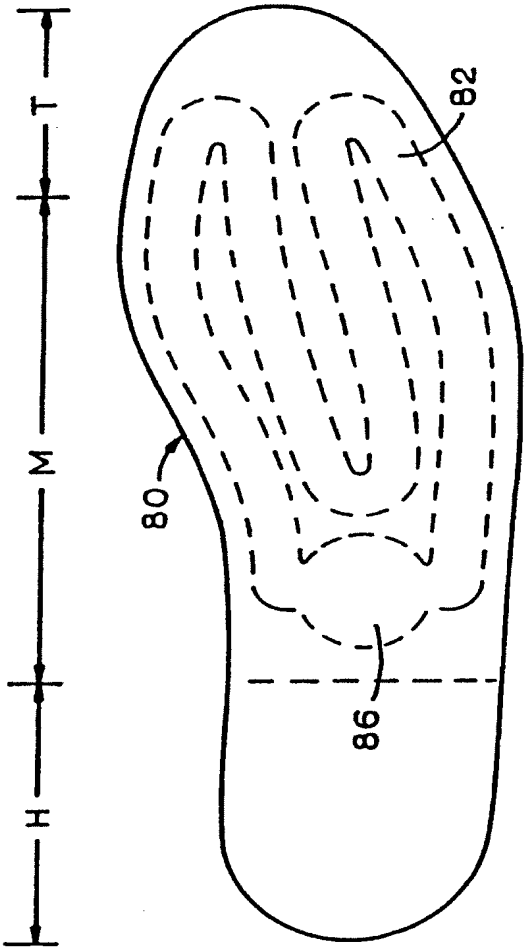

FIG. 12

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 92/10863

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 A43B3/26

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	A43B

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
A	WO,A,9 011 698 (H. ROSEN) 18 October 1990 see the whole document	1,7
A	US,A,3 686 777 (H. ROSEN) 29 August 1972	1,7
A	US,A,4 858 341 (H. ROSEN) 22 August 1989 see the whole document	1,7
A	DE,A,1 915 457 (H. ROSEN) 13 November 1969 see the whole document	1,7
A	US,A,5 060 402 (H. ROSEN) 29 October 1991 cited in the application see the whole document	1,7

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
01 APRIL 1993	[illegible] 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	DECLERCK J.T.

Form PCT/ISA/210 (second sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

US 9210863
SA 68581

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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